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## Looking back at 10 years of groundwater protection

In 1998, the Groundwater Remediation Project (GRP) was established as Hanford's newest major cleanup endeavor. Now managed by Fluor Hanford, it is a cross-cutting project that works with scientists from Pacific Northwest National Laboratory and other Site contractors and subcontractors to understand and remediate contamination plumes that could affect the Columbia River.

The GRP has five major tasks: remediate waste sites; shrink the footprint of contaminated areas; reduce "recharge" (re-supply) of water that may drive contaminants in the soil deeper into the subsurface; implement final groundwater remedies; and integrate groundwater monitoring needs. To accomplish these tasks, GRP operates pump-and-treat systems at key locations on the Hanford Site where concentrated plumes of contamination can be intercepted and cleaned. The Project also manages test systems in the 100 Areas that apply new approaches to chemically alter the contaminants in groundwater.

In addition, GRP decommissions old wells that are pathways for contaminants to move into groundwater; and drills new wells for monitoring groundwater, extracting contaminated groundwater, and injecting treated groundwater. Extensive monitoring programs, underground mapping, records searches, and investigations of new technologies to provide better remedies for groundwater contamination are also vital parts of the GRP.

Significant actions have already been completed under the plan: eliminating or reducing drivers of groundwater contaminants, and pumping and treating contaminated water.

### Putting the brakes on things that "drive" contamination

Numerous and varied sources of groundwater contamination have either been eliminated or reduced:

- stopped discharging liquid waste into the soil in 1995, as called for in Milestone M-17-00 of the Tri-Party Agreement
- pumped the retrievable liquid out of all 149 underground, single-shell waste tanks to prevent leaks
- installed berms – short walls of soil and gravel – to prevent flooding over the tanks, and decommissioned obsolete water lines in, or near, the tanks

- refurbished four miles of water lines using the effective, yet inexpensive, mortar-lining technique to help prevent water leaks near waste sites (including about one-half mile of water lines in 2005)

• removed 6 million tons of contaminated soil from waste sites along the Columbia River that have contributed to, or could contribute to, contaminated plumes of groundwater

- removed approximately 65 million curies of radioactive material from facilities and waste sites near the Columbia River.

### Pumping and treating groundwater

Ten billion liters of contaminated groundwater have already been pumped out of the aquifer and treated at six pump-and-treat stations located on the Hanford Site.

Since 1995, four systems for pumping and treating contaminated groundwater have been installed near the river. In 1995, the first pump-and-treat system was built near the river in the 100-N Area to remove



*Hanford's groundwater remediation involves a variety of activities including mortar-lining of leaky water pipes (top left); drilling boreholes for sampling (top right); and well drilling (bottom).*

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strontium-90 from groundwater. Three other pump-and-treat systems were installed close to the river in the 100-D, 100-H and 100-K areas in 1997 to remove hexavalent chromium. This form of chromium potentially threatens the health of juvenile salmon living in the river.

On the Site's Central Plateau, two pump-and-treat systems were installed in 1995. The pump-and-treat station near the Plutonium Finishing Plant has removed 85,000 kg of carbon tetrachloride, a carcinogen, from the soil and groundwater. The pump-and-treat system installed near the U Plant processing canyon cleans the groundwater of uranium and technetium-99.

Two of the six pump-and-treat systems are close to meeting cleanup objectives defined in a regulatory Record of Decision. The "heart" of a plume of contamination near U Plant has been removed and pumping has been suspended while the area is monitored for rebound. The system removed 212 kg of uranium; 2.02 curies (119 grams) of technetium-99; and 27,344 kg of nitrate. In addition, much of the contaminant plume containing hexavalent chromium near the H Reactor has been removed, and pumping may be suspended in 2006.

### Putting innovative technologies to work

Innovative technologies have been implemented to replace or augment pump-and-treat systems treating groundwater under the Hanford Site:

- installed a chemical barrier near the D Reactor to decrease the amount of hexavalent chromium in the groundwater that is moving toward the Columbia River
- began evaluating a system that uses calcium polysulfide to treat hexavalent chromium in the ground and groundwater near the K Reactors (2005)

- began field activities to test a technology (apatite sequestration) to stop strontium in the groundwater near the N Reactor from moving toward the nearby river.

### Building on other accomplishments

Work on wells and system improvements contributed to the progress made in remediating Hanford's groundwater in 2005:

- decommissioned 116 wells in 2005 and approximately 500 wells since 1995, including 250 high-risk wells that were considered potential pathways for moving contaminants into groundwater
- installed a cumulative total of 45 monitoring wells in the past three years; efforts to install wells are currently six-months ahead of the schedule set by the Tri-Party Agreement
- upgraded all systems for pumping and treating plumes of hexavalent chromium contamination along the Columbia River
- increased the throughput of the system for pumping and treating carbon tetrachloride from 190 gallons per minute to 275 gallons per minute
- initiated field activities to evaluate alternatives for addressing a plume of uranium contamination in Hanford's 300 Area.



A pump-and-treat system was installed in 2004.

### What's ahead?

Four major activities to remediate Hanford's groundwater are planned through calendar year 2006:

- shut down the pump-and-treat system in the 100-H area, after successfully remediating the contamination plume of hexavalent chromium (through 2006)
- install a new treatment barrier in the 100-N Area to fix strontium-90 in place (winter of 2005-2006)
- report on integrated assessment of technetium-99 plume in the tank farm area (fiscal year 2006)
- drill new wells – 8 of 15 required in calendar year 2006 are complete (2006).